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(19) **United States**(12) **Patent Application Publication****Chan et al.**(10) **Pub. No.: US 2017/0170313 A1**(43) **Pub. Date: Jun. 15, 2017**(54) **METHOD OF PRODUCING A
PRE-PATTERNED STRUCTURE FOR
GROWING VERTICAL NANOSTRUCTURES***C30B 25/04* (2006.01)*H01L 29/06* (2006.01)*H01L 29/20* (2006.01)(52) **U.S. CL.**CPC *H01L 29/7827* (2013.01); *H01L 29/0669*(2013.01); *H01L 29/045* (2013.01); *H01L**29/16* (2013.01); *H01L 29/20* (2013.01);*H01L 21/02603* (2013.01); *H01L 29/66666*(2013.01); *C30B 25/04* (2013.01); *C30B 29/40*

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Rooyackers**, Kessel-Lo (BE)(73) Assignee: **IMEC VZW**, Leuven (BE)(21) Appl. No.: **15/351,504**(22) Filed: **Nov. 15, 2016**(30) **Foreign Application Priority Data**

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A method of producing a pre-patterned structure comprising at least one cavity for growing a vertical nanostructure is disclosed. The method includes providing at least one protruding structure that extends upwardly from a main surface of a substrate. The at least one protruding structure has a main portion of a first height and an upper portion on the main portion. The method also includes embedding the at least one protruding structure in a dielectric material. Further, the method includes removing at least an excess portion of the dielectric material, thereby exposing a top surface of the upper portion and forming a flattened surface of the top surface of the upper portion and the dielectric material. In addition, the method includes forming at least one cavity of a first depth by removing the upper portion, thereby exposing a top surface of the main portion of the at least one protruding structure.

